May 10, 1932. F. M. BRACKETT ET AL 1,858,034

END SHEET FOLDING APPARATUS

Filed May 5, 1930 3 Sheets-Sheet 1

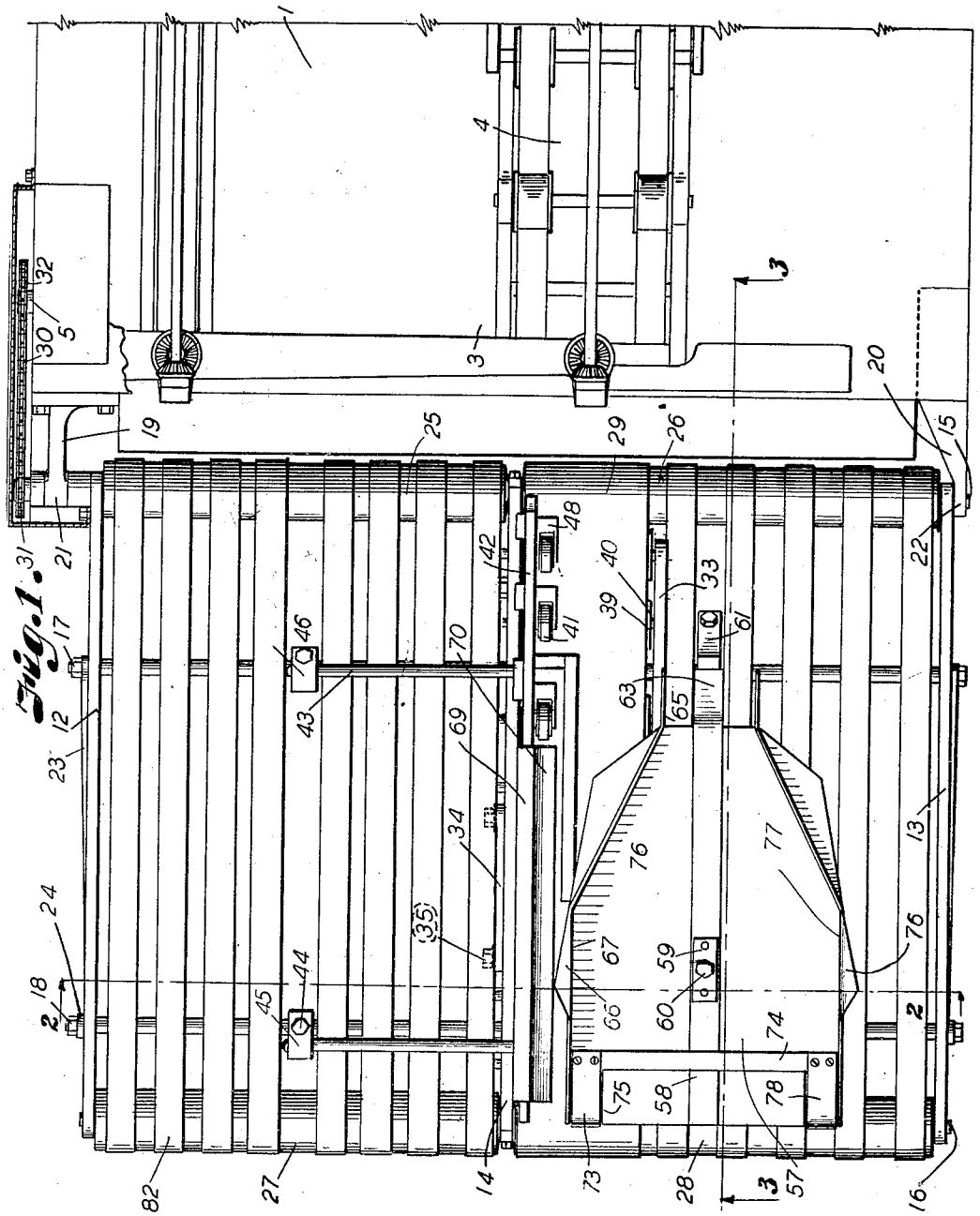

Fig. 1.

INVENTORS
Fred M. Brackett,
Leo C. Williams, and
Dietrich Dgneke.
BY Arthur C. Brown
ATTORNEYS.

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END SHEET FOLDING APPARATUS

Filed May 5, 1930 3 Sheets-Sheet 2

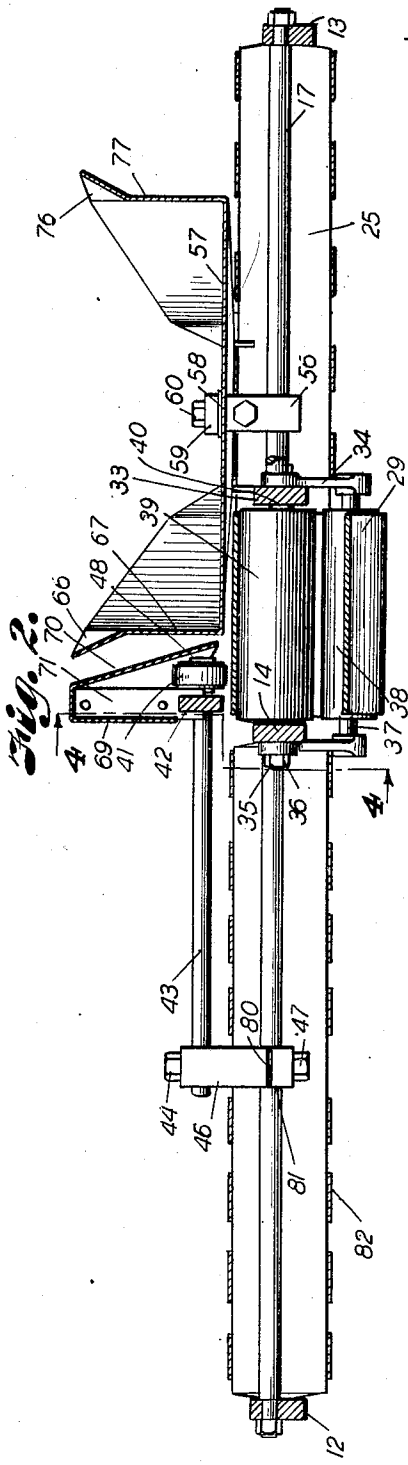

Fig. 2.

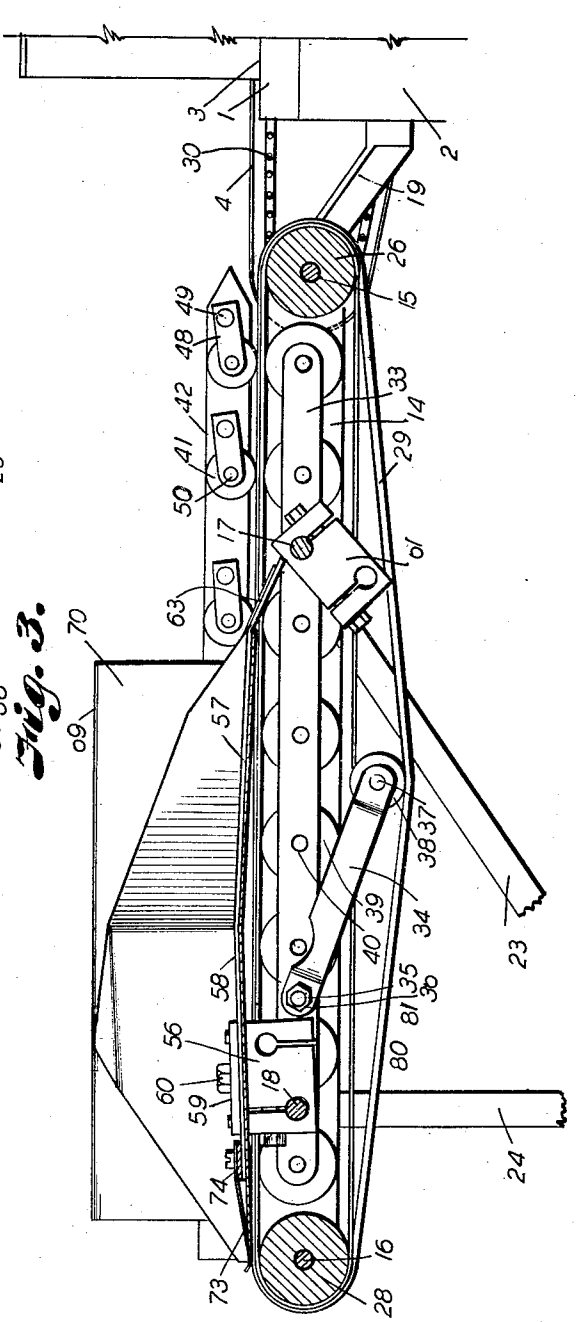

Fig. 3.

INVENTORS
Fred M. Brackett,
Leo C. Williams, and
Dietrich Daneke.
BY Arthur E. Brown
ATTORNEYS.

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Filed May 5, 1930 3 Sheets-Sheet 3

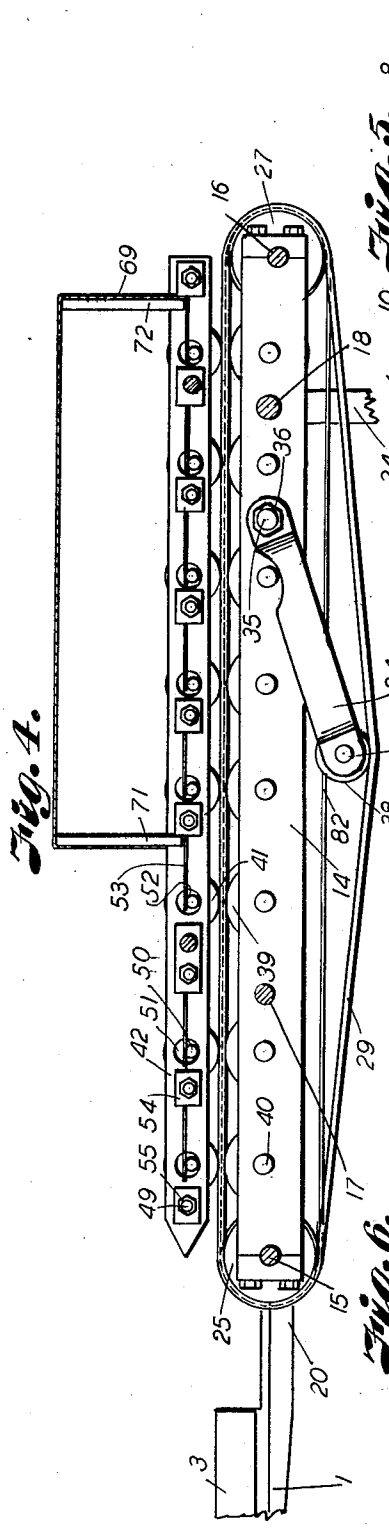

Fig. 4.

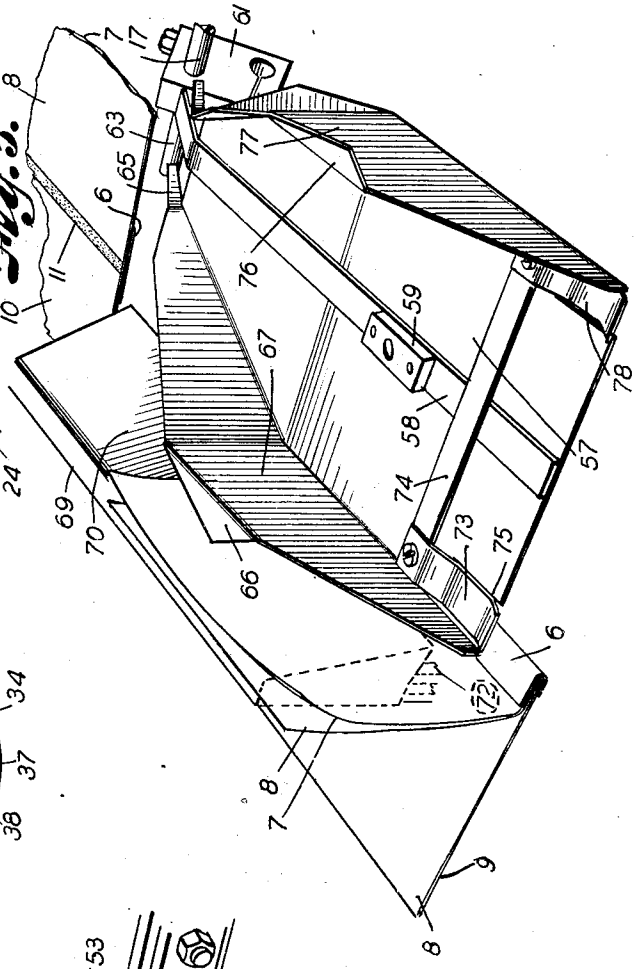

Fig. 5.

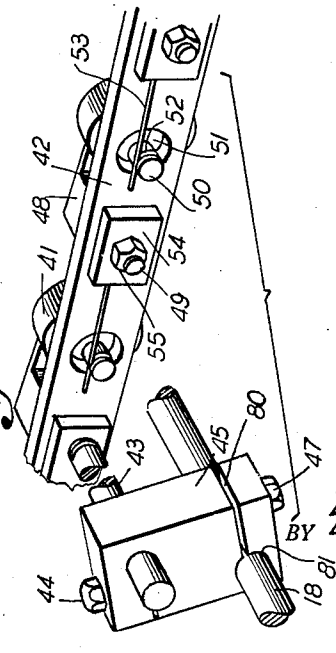

Fig. 6.

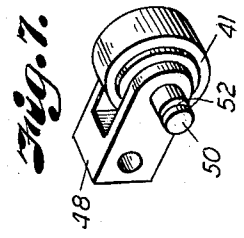

Fig. 7.

INVENTORS
Fred M. Brackett,
Leo. C. Williams, and
Dietrich Daneke.
BY Arthur E. Brown
ATTORNEYS.

Patented May 10, 1932 1,858,034

UNITED STATES PATENT OFFICE

FRED M. BRACKETT, LEO C. WILLIAMS, AND DIETRICH DANEKE, OF TOPEKA, KANSAS, ASSIGNORS TO THE BRACKETT STRIPPING MACHINE CO., OF TOPEKA, KANSAS, A COPARTNERSHIP CONSISTING OF EDWARD M. BRACKETT AND FRED M. BRACKETT

END SHEET FOLDING APPARATUS

Application filed May 5, 1930. Serial No. 449,812.

Our invention relates to stripping machines whereby a binding strip is attached to parts of a book or other work to form or reinforce a hinge joint between said parts and one of the parts is tipped for attaching the inner margins of the parts when the book is folded.

In ordinary practice the work, for example a tipped signature hinged to an end sheet, is delivered in open position and is manually folded to press the tipped margin of one part to the corresponding margin of the other part, not only involving laborious operations and consuming an excessive amount of time, but incurring the hazard that the books may be soiled or rumpled and that pressure may not be applied in the manner best suited to effect the joining of the marginal portions.

Our invention therefore has for its principal objects to provide apparatus adapted to fold an open tipped book and apply pressure to marginal folded portions for causing the inner margins of the book parts to adhere to each other, to provide an attachment adapted to receive an open tipped book from a stripping machine or the like and automatically effect the attachment of book parts and deliver folded books, and to automatically fold an end sheet over a tipped signature and apply pressure to a limited marginal portion of the end sheet for effecting attachment thereof to the tipped portion of the signature.

In accomplishing these and other objects of our invention, we have provided improved details of structure, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a plan view of a portion of a stripping machine and a folding attachment constructed in accordance with our invention mounted in receiving and driven relation with the machine.

Fig. 2 is a vertical cross section on the line 2—2, Fig. 1.

Fig. 3 is a longitudinal section through the attachment on the line 3—3, Fig. 1.

Fig. 4 is a longitudinal vertical section on the line 4—4, Fig. 2.

Fig. 5 is a detail perspective view of shield and guard members and adjacent portions of the attachment, connected end sheets and signatures being shown fragmentarily before and during folding and attaching steps.

Fig. 6 is a detail fragmentary perspective view of rollers and roller supports for retaining book parts while being acted upon by the apparatus.

Fig. 7 is a detail perspective view of a roller and its mounting.

Referring in detail to the drawings:

1 designates the delivery end portion of a stripping or tipping machine including end vertical frame members 2, a table or bed plate 3 supported by the frame, belts 4 for conveying work across the machine, and an operating shaft 5.

The machine is illustrated as adapted to apply a hinge strip 6 to the back edge portions of a waste sheet 7 integral with an end sheet 8, and the back page of a signature 9, and to tip the signature by applying to the front page 10 thereof along the back margin, a stripe 11 of glue whereby the inner margin of the page may be attached to the inner marginal portion of the end sheet when the end sheet and signature are folded together on their hinge connection.

It is apparent, of course, that the work may consist of a single or compound end sheet and the signature may consist of any number of leaves.

The signature and end sheet hingedly connected by the strip are ordinarily delivered flat from the bed of a stripping or tipping machine to a shelf and operators then fold the end sheet over the signature and apply pressure to the marginal portions of the closed assembly to effect adhesion between the portions.

Our invention relates particularly to an attachment adapted to be mounted in receiving relation with a machine of the character described to receive the open stripped and tipped assemblies, automatically fold the same, and effect the attachment of the end sheets to the signatures.

The attachment includes a frame-like support comprising parallel end bars 12 and 13,

an intermediate middle bar 14, driving and driven shafts 15 and 16 mounted in the ends of the bars, intermediate rods 17 and 18 having ends fixed in the bars, and brackets 19 and 20 attached to the machine at opposite sides thereof having journal portions 21 and 22 respectively, for receiving the ends of the shaft 15 for pivotally supporting the attachment. Sets of braces or legs 23 and 24 pivotally mounted on the rods 17 and 18, are adapted to support the attachment in horizontal position so that connected signatures and end sheets may be delivered thereto from the bed plate.

Laterally spaced sets of drive rollers 25 and 26 and driven rollers 27 and 28 are mounted on the shafts 15 and 16 respectively and a relatively wide and stiff flexible belt 29 is mounted on the inner ends of the rollers 26 and 28, the shaft 15 and roller 26 being driven by a chain 30 running on a sprocket 31 on the shaft 15, and a sprocket 32 on the shaft 5.

A second intermediate bar 33 mounted on the intermediate shafts and spaced laterally from the outer edge of the belt cooperates with the middle bar 14 to form a support for a belt tightening device including crank arms 34 having inner ends mounted on bolts 35 fixed to the bars 14 and 33 and adapted to be clamped to the bars by nuts 36 and having outer ends connected by a shaft 37 for supporting a roller 38 in engagement with the lower run of the belt.

The intermediate bars further support a plurality of rollers 39 having spindles 40 mounted in the bars, the rollers supporting the upper run of the belt in horizontal position and being adapted to cooperate with signature pressing rollers 41 mounted on a bar 42 later described, for moving the signature across the attachment and retaining the signature against lateral movement while being operated upon.

The upper roller bar 42 is supported by an adjustable and movable frame including a pair of rods 43 having ends mounted in the bar and outer ends removably fixed by bolts 44 in clamps 45 and 46 fixed to the intermediate shafts by bolts 47, as clearly illustrated in Fig. 6.

The rollers are mounted in yoke-like brackets 48 which are pivotally supported on bolts 49 mounted in the bar 42 and have axles 50 projecting through relatively large openings 51 in the bar beyond the outer face of the same and provided with annular grooves 52 to receive resilient fingers or springs 53 projecting from spacing blocks 54 mounted on the bolts 49 and retained by nuts 55. The springs are adapted to press the rotatable and pivotally supported rollers downwardly against the belt at points contacted by the lower rollers as clearly shown in Figs. 3 and 4.

In order to simplify construction and reduce the number of parts required, the bar supporting rods may take the place of bolts 49 for supporting selected roller brackets as illustrated in Fig. 6.

The rollers 41 and 39 are located adjacent the inner edge of the belt and in the path of the signature to engage the same in spaced relation with the tipped marginal portion thereof to afford space for folding the end sheet over the signature as presently described.

Mounted on the intermediate rod 18 is a clamp bracket 56 for supporting an end sheet folding device including a bottom plate 57, and having a stiffening rib or band 58 extending longitudinally therealong, a block 59 fixed to the rib forming a reinforcing member apertured so that a bolt 60 may be passed through the block, rib and bottom plate into the clamp.

The rib projects angularly downwardly from the rear end of the bottom plate and a clamp 61 mounted on the intermediate rod 17 is adjustable to engage the end of the rib for supporting the rear end of the folding device at a suitable elevation above the belt, the rib being located in laterally spaced relation with the belt and sets of rollers.

The plate 57 is adjustably supported with its forward inner longitudinal edge portion 63 located adjacent the path of the inner edge of the glue stripe on the signature and thus extending over the path of the back edge marginal portions of the end sheet and signature, such relation being particularly well shown in Fig. 5. The inner edge of the plate tapers rearwardly away from the edge portion 63 and terminates at a point exterior to the outer edge of the belt, and a wing 65 inclined upwardly inwardly over the bottom plate is erected on the angularly extending edge portion of the bottom plate to engage under the advancing free corner of the end sheet and lift the same, while the signature and end sheet are being moved across the attachment.

The back marginal portions of the signature and end sheet will therefore pass under the inner edge of the bottom plate.

A triangular flange 66 projects toward the area occupied by the signature from the upper edge of a vertical side plate 67 erected on the edge of the bottom plate, to engage the outer free edge portion of the end sheet and tend to shift the same laterally toward the signature.

A guard wall member 69 having an inclined face 70 is provided with spaced legs 71 and 72 at opposite ends for mounting on the roller bar 42 to support the folded over end sheet and prevent the same from falling into overlying relation with the signature.

A resilient arcuate tongue or finger 73 is fixed to a stiffening bar 74 mounted on the

bottom plate and operates in a notch 75 in the outer end of the bottom plate adjacent the side wall 67 upon the folded-over portion of the end sheet to press the back marginal portion of the end sheet against the tipped margin of the signature.

The structure so far described is adapted to fold over and attach an end sheet fixed to a signature as illustrated in Fig. 5.

In order to provide for readjustment of the parts of the attachment to fold members oppositely, that is to fold an end sheet and signature when the same are oppositely related, the folding device is formed with duplicate parts, the bottom plate comprising similar halves and therefore having inclined wings 76 and walls 77 on its opposite edge and a resilient finger 78 at the front edge of the plate opposite to the finger 73.

The rearrangement of the parts is further promoted due to the manner of mounting the rollers and guard member 69, and the clamps are made with reversible portions, for example the clamp brackets having oppositely extending slots 80 and rod receiving openings 81 at the inner ends of the slots whereby the folding device and bar 42 may be mounted on the opposite sides of the belt from the positions shown in Fig. 1.

When the end sheet folding device is located on the opposite side of the belt the roller supporting bar is removed from the clamps 45 and 46 and then mounted in the clamps 56 and 61 on the opposite side of the belt to cause the rollers 41 to engage the opposite edge portion of the belt.

While the bar is being moved, the roller axles will be retained in the bar openings, and pressed against the inner edges of the openings by the spring fingers. The bar will be turned over when repositioned, and the spring fingers may then be removed from the axle grooves and replaced in opposite relation with the roller axles to press the rollers downwardly against the belt.

The guard member 69 is turned about so that its inclined face 70 may be properly presented to the end sheet and replaced on the roller supporting bar 52.

Tapes 82 are further provided on the driving and driven rollers, to assist in supporting the signatures and end sheets, and are spaced to permit the projection of the clamps therebetween for supporting the roller bar and folding device from the intermediate transverse shafts.

What we claim and desire to secure by Letters Patent is:

1. In apparatus of the character described, a support, means for moving a book across the support, means for effecting partial closure of the book while the same is being moved across the support, and means operating on the partially closed area of the book to press the margin of one portion thereof against the opposite portion.

2. In combination with a machine including means for applying an adhesive element to a margin of a book or the like and means for moving the book including actuating mechanism, an attachment operable by the actuating mechanism of the machine including book moving means, means for effecting partial closure of the book while the same is being moved across the attachment, and means operating on said partially closed portion for pressing the margin of the same against the opposite portion to render the adhesive element effective.

3. In apparatus of the character described, a support, a conveyor for moving a signature and an end sheet hinged thereto across the support, means for effecting partial closure of the end sheet over the signature while the same are passing across the support, means for effecting bending of a limited area of the back marginal portion of the end sheet into engagement with the similar margin of the signature, and means operating automatically to press said bent portion of the end sheet into engagement with said marginal portion of the signatures.

4. In combination with a machine adapted to deliver a sheet in open position, an attachment for the machine including means for translating the sheet, means including a horizontal shield having a vertical wing extending over a portion of the path of the sheet for effecting movement of one portion of the sheet toward the adjacent portion, and means for limiting the movement of the first named portion of the sheet.

5. Apparatus of the character described including a support, means for moving a sheet including parallel portions across the support, means including a shield having a vertically extending wing for folding one of said portions over the other of said portions while the sheet is passing across the support, means for supporting the free edge of said folded-over portion of the sheet, and means including a resilient finger on said shield operating on said folded portion for pressing said portions together.

6. Apparatus of the character described including a support, means including a belt for translating a sheet including hinged leaves having an adhesive stripe on the inner margin of one of said leaves across the support, means including a shield having a vertical wing extending over a portion of the path of the sheet for moving the inner margin of one leaf into overlying relation with the inner margin of the adjacent leaf, and means including a resilient finger supported by said shield and bearing against the belt for pressing said margins into adhering engagement while the sheet is being translated across the support.

7. In apparatus of the character described, a support, means for moving a book consisting of hinged leaves across the support, a horizontal shield mounted on the support having a depending finger extending in the path of the sheet to engage one of said leaves to cause the same to rise while moving across the support, and adapted to fold the inner margin of said leaf over the adjacent margin of the other of said leaves, a wing at the edge of the shield for effecting movement of the free edge portion of said leaf toward vertical position, and means on the support for supporting said free edge portion in substantially vertical position.

8. Apparatus of the character described including a support, a belt movably mounted on the support for moving a signature and end sheet across the support, a plurality of sets of rollers engaging the upper run of the belt on opposite sides thereof to latch the signature to the belt, and means for effecting folding movement of said end sheet toward said signature while the same is being moved across the support.

9. In apparatus of the character described, a support including a frame and an endless belt running on the frame, a roller bar having a series of openings, a series of rollers having pivotal mounting on said bar and axles projecting through said openings, means removably supporting the bar from the frame above the belt, and springs fixed to said bar and engaging said roller axles to urge the rollers into engagement with the belt for latching a sheet to the belt.

10. In apparatus of the character described including a support, an endless belt, and means for moving the belt across the support, means for latching a sheet or the like to the belt, including a bar having an opening removably mounted on the support above the belt, a roller having an axle extended to project through said opening and provided with an annular groove, a bracket pivotally supporting the roller from the bar, and a resilient finger fixed to the bar and extending across said opening to engage in said groove for urging the bracket-supported roller into engagement with the belt.

11. In apparatus of the character described including means for delivering a sheet provided with a moist adhesive stripe arranged longitudinally thereon and spaced from the side edges of the sheet, means operable on a limited area of the sheet adjacent said stripe and having a member bearing on said limited area to press said area upon the stripe.

12. In end sheet folding apparatus, moving means for supporting a sheet, and stationary means engageable with a limited intermediate portion of the moving sheet and having means effective upon continued movement of the sheet for folding said limited portion on a longitudinal fold line into engagement with the corresponding limited portion of the sheet on the opposite side of the fold line.

13. Apparatus of the character described including means for applying a longitudinal adhesive stripe on the inner marginal portion of one of a pair of hinged sheets adjacent the hinge thereof, and means operative on the other of said sheets for folding said last named sheet on the hinge into engagement with the first named sheet.

14. Apparatus of the character described including a support, a belt for moving a sheet across the support, means including a pair of rollers engaging opposite sides of the belt for retaining the sheet in engagement with the belt, and means for effecting folding movement of the sheet while the same is being moved across the support.

15. In apparatus of the character described including a support and a member movable on the support, a bar mounted on the support adjacent said member, a roller having pivotal mounting on the bar, an axle on the roller, and resilient means on the bar engagaing the axle to urge the roller into engagement with said member.

16. In apparatus of the character described including a support and a belt running on the support, an apertured bar mounted on the support above the belt, a roller having pivotal mounting on the bar, an axle on the roller projecting into the aperture of the bar, and a spring fixed to the bar and having a free end engageable with the axle for urging the roller into engagement with the belt.

In testimony whereof we affix our signatures.

FRED M. BRACKETT.
LEO C. WILLIAMS.
DIETRICH DANEKE.